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THE SCIENCE TEACHER

- Elementary School Science in the Past Century
- Science Teaching with Modern Facilities
- Sesquicentennial of the Coast and Geodetic Survey
- Summer Institute Programs for Science Teachers

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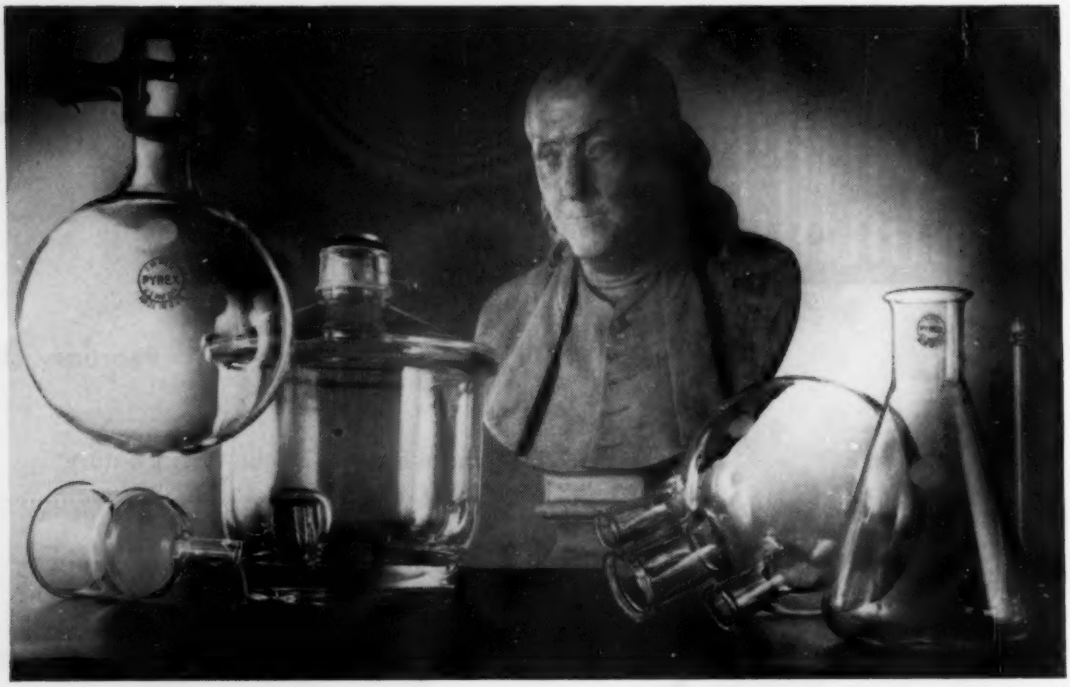

THE SCIENCE TEACHER

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Coming . . .

in *The Science Teacher*

- 1957 Convention Highlights
- A Report on Summer Research Assistantships
- Science Project Ideas
- Objects and Specimens for Biology
- Vapor Pressure

Editor's Column

How long are people going to continue trying to alleviate a problem situation without coming to grips with the very core of the problem?

The problem is how to get and keep sufficient numbers of qualified, competent science teachers. And the core of the problem is, in my opinion, salaries.

"But," many people say, "salary is not the whole answer." And they're right—it's perhaps only 90 per cent of the answer. Other factors would include teaching facilities, teaching load, professional atmosphere, and the like, but we'll not dwell on these right now.

We've heard dozens of proposals for "stimulating and recognizing" good science teaching—scientists in the classroom, science teacher of the year, fellowships for summer study, and so on. Not a single one of these hits the real target—salaries. What is amazing is the amount of effort and creativeness invested in plans to improve American education without much increased spending for salaries.

The latest effort coming to my attention is a contest in which teachers in a local area have volunteered to give a 40-minute demonstration of a lesson designed to "teach a scientific principle and, at the same time, stimulate students toward careers in science." A three-man team of observers will witness all the demonstrations and then come up with the winners.

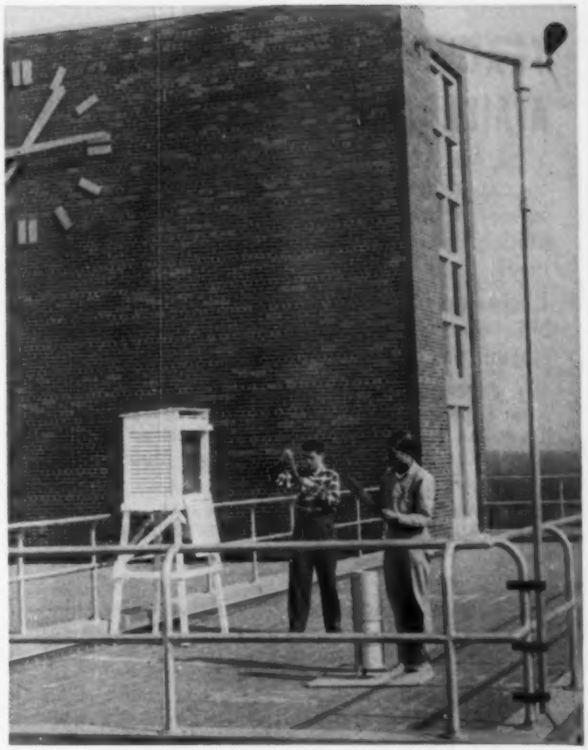
It's hard for me to see any deep-seated, long-lasting value or much stimulative or prestige effect in this plan. Judging teaching effectiveness on such limited evidence seems most presumptious. Frankly, I think that as a group of professional workers, we should reject outright such proffered "assistance."

What, then, can well-intentioned groups and individuals do? They can, in proper ways, "go to bat" for adequate financial support of our schools, especially for dollars earmarked for teacher salaries. Salary targets may vary, but a good guide is the goal set by NEA: $4500-$10,000.

On the matter of salaries, one question—that of merit—keeps coming up. Our friends at collegiate levels, in business and industry, and in other professional lines cannot understand why so many teachers vigorously oppose merit plans and with equal vigor defend single salary schedules. I can't understand it, either. I have never been happy with the "treat us all alike" theory of salary schedules—"another year, another increment, no matter what."

I'll admit that so long as $4000-$5000 maximums prevail for master's degree teachers of 15-20 years' experience, it is rather futile, even ludicrous, to talk of merit. Nevertheless, it seems to me that when we ask our friends to come to grips with this problem of better salaries for teachers, we in the teaching profession have a counter obligation to come to grips with the problem of merit. We should set up the most objective fact-finding, research-type study we can for assessing the pros and cons of merit, the values and benefits, the hazards and roadblocks. We should invite our nonschool friends to help us do this. The results would be good for them and for us.

Robert H. Carleton



THIS MONTH'S COVER . . . is a photographic report on what can be accomplished with modern scientific facilities. It's a picture of two students atop the academic studies building of the new Ann Arbor, Michigan, High School. The students are seen reading the school's psychrometer and rain gauge. Upper right are the anemometer and wind vane used by the students to report on their weather findings.

To learn more about what can be done with science teaching with "modern dress," read Mahlon Buell's article, beginning on page 16 of this issue.

There is still, however, the fact that science teachers can effectively look both backward and forward. Therefore, there are other articles to recommend in this issue of *TST*, such as Gerald Craig's lead article on "Elementary School Science in the Past Century," a companion piece to Sidney Rosen's article in the November *TST*. Dr. Craig's article starts on page 11. And while we're looking backward, there's also the article on the Sesquicentennial of the Coast and Geodetic Survey, which you'll find on page 19.

For Your Calendar: February 15 and 16 are the dates of a general conference on Junior Academies of Science, sponsored by the Academy Conference of the American Association for the Advancement of Science. The place is the Navy Pier Campus, University of Illinois, Chicago. For more data, write to Dr. I. E. Wallen, AAAS, 1515 Massachusetts Avenue, N.W., Washington 5, D. C.

Readers' Column

Congratulations on *Tomorrow's Scientists*! This paper has real promise in the degree to which the "kids" can become interested to contribute as well as consume. I do feel, however, that the material will have to be carefully edited. For example, in the December issue (Volume 1, Number 2), the first item of "What's Your Sci-Q" poses the question about perihelion and time of year. The question obviously has two answers depending on the hemisphere of location; only one answer was given in the key. The terminology of such patterns will have to go through careful examination.

EVAN C. RICHARDSON
Newark, New Jersey

I want to comment about your letter on "Our Mr. Sun" recently sent to NSTA members. You pointed out how some people feel that gaining an understanding of the purposes and methods of research is far more important than learning the parts of the grasshopper. This is true, of course, when teaching the parts of the grasshopper is done solely to have the students know these parts. However, when the systems of the grasshopper, a typical insect, are learned with the purpose of showing why insects are such a successful class of animals and why man has constantly to do research to keep insects under control—then learning this information becomes most valuable.

Biology students can learn a lot of principles concerned with scientific research, the ability of a group of organisms to survive, bits of information leading to an understanding of the theory of evolution, etc., by applying information learned from examining the structures of different organisms. You might be interested in bringing these viewpoints to the attention of readers of *The Science Teacher*.

FRANK X. SUTMAN
Paterson, New Jersey

EDITOR'S NOTE: *The two letters above indicate that our New Jersey readers are really "on the ball." Everyone needs such help now and then and we appreciate it.*

I was extremely interested in your Editor's Column in the December issue of *The Science Teacher*, because the further I read, the more I felt you were describing me to a "tee." For I did just as you described.

We did start with an insect unit; the kids did do insect collecting and got extra credit (I now wonder

if they got extra learning) for extra numbers of specimens. If this is wrong, I need help. Where can a person turn for the right answers concerning methods, especially when teaching five classes, one right after the other? Frankly, I did not get one single methods course in college (a liberal arts college). The methods I use are ones I devise as the years go by.

Another thing you said struck me as being true. The present science institutes do push subject matter. I have done work beyond a master's degree but have never given much thought to methods courses because no one ever seems much interested in them. From what I've seen, the methods courses are "how to build a terrarium" or "ant houses" or "how to grow fern prothallia."

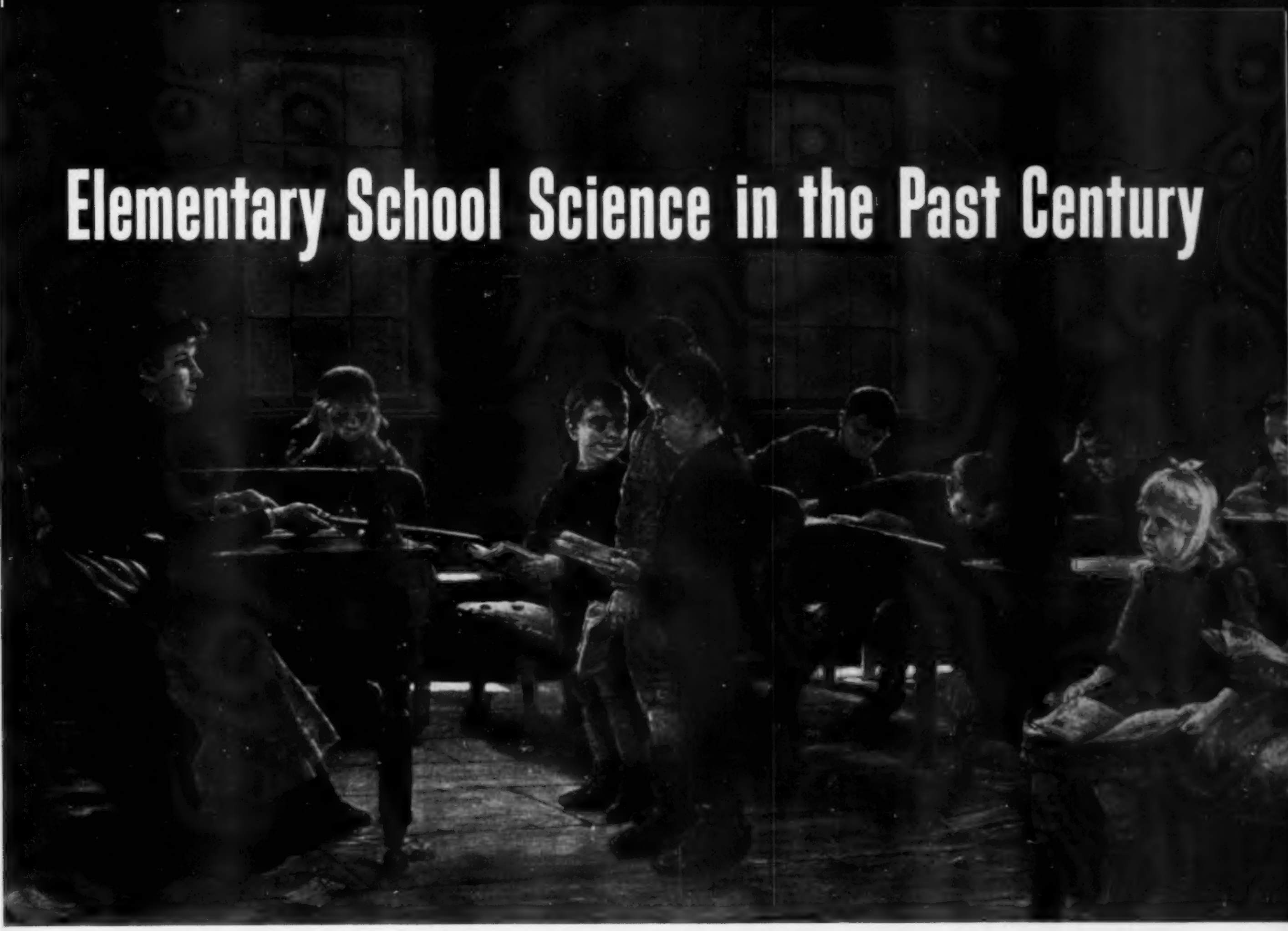
Yea! to your article. More research is needed on the right (meaningful) approach to science teaching.

A PENNSYLVANIA TEACHER

Enclosed is a check for $10 to pay another installment on my NSTA Life Membership. I want to keep this up even though I have now left teaching after eight years (six at Aberdeen, South Dakota). I am now a research chemist with the Burgess Battery Company.

THOMAS H. LOVERUDE
Freeport, Illinois

Elementary School Science in the Past Century



By GERALD S. CRAIG

Professor Emeritus of Natural Sciences, Teachers College, Columbia University, New York City

THE National Education Association is observing its first 100 years of service to the nation and the world. It seems altogether fitting in this Centennial Year that persons interested in the improvement of science education give some attention to the history of American education. Through a knowledge of the origins and developments of science in education, we as teachers may be wiser in designing the science in future programs of education. It is the purpose of this article to discuss briefly a few of the events of the past 100 years and relate these events to the present trends in the development of science in the elementary school.

The present elementary school science was initiated in the 1920's and 1930's by a number of public school systems and teacher educational institutions as it became evident that nature study was not well designed for the educational needs of children. This development is so recent that many, if not most, of the teacher educational institutions of the nation are still in the process of retooling; that is, reorganizing their staffs and curricula in order to meet the demands for science in the professional education of classroom teachers.

Science during the period of the late 18th and for a considerable portion of the 19th century was frequently labeled "natural history" or "natural philosophy." The natural history consisted of the study of plants, animals, minerals, and other natural objects. The natural philosophy was the study of nature in general. The natural history became the biology of today and the natural philosophy became the physics and chemistry.

The late Professor Orra E. Underhill, in a scholarly study published in 1941, revealed that the roots of our modern elementary school science are deep in the history of American education and American science. Instruction in science, according to Dr. Underhill, can be traced to the late 18th century when children's literature (known as the didactic literature) was designed for the purpose

of instruction. Some of this literature directed children's observation and study of natural phenomena. Although these books were largely of British origin, many were brought to the United States and were adapted to the new world and reprinted by American publishers. Underhill has traced this literature to the influence of Francis Bacon, John Locke, and other writers who stimulated democratic thought on both sides of the Atlantic Ocean.

This instructional literature was designed for use with parents or tutors teaching the children at home. Only the upper class families could afford to give the children the advantages of such an education. At the time the NEA was being organized (1857), some of this literature was being adapted for use in schools.

Pestalozzian Teaching

At the same time (1857), "Pestalozzian object teaching" was attracting the attention of both European and American educators. The NEA was instrumental a few years later in securing the almost universal adoption of the "Oswego object teaching" which was an American version of the Pestalozzian methods. With the introduction of this new method, there was an upsurge of interest in the revision of content and method of the elementary school. This came at a time when there was increased growth in the elementary school enrollment and the newly-organized NEA was directing efforts toward the development of the elementary school as the great common school—common in that it was the institution intended for all the people regardless of social class, religion, nationality, or race.

As we look back on the period of object teaching, it is easy to emphasize its obvious weaknesses rather than its contributions. In any appraisal of this method, we should keep in mind that object teaching was an international educational development. In Germany, it evolved into Heimatkunde. In both England and the United States, object teaching was supplanted by nature study. The English and American versions of nature study differed greatly.

During the period of the development of object teaching (1860-1880), the emphasis on a highly formal methodology obscured the direction and the purpose of science. In many ways object teaching was an intrusion in the development of elementary school science. The continuity that had grown from the promotion of science by our forefathers who were interested in the development of science in elementary education, such as Franklin and Jefferson, was interrupted by the introduction of object teaching. It might be said, too, that as an importation from Europe it lacked the vigor and support of a movement which was associated with the American frontier. As far as instruction in science in the elementary school was concerned there was a mere emphasis on descriptions of animate and inanimate objects rather than on interpretations of phenomena or events. In most cases the organization of questions about the objects were dictated by the formal organization of the separate sciences and as a result represented an adult imposition of learning upon a child. Object teaching was designed to encourage a description of obvious and trivial matters to the neglect of the profound and challenging meanings.

Object teaching was based upon the principles of faculty psychology. Assumptions of a serial development of the faculties led to the emphasis on observations and memorizing in the primary years. It was assumed on the basis of faculty psychology, that young children were able to observe and identify objects but they lacked the ability to interpret phenomena. The specialized methodology of object teaching together with the exclusion of the use of books made heavy demands upon the ability and knowledge of the teacher. Object teaching was not well designed for either children or teachers. It was not realistic and lacked the challenging ideas and purposes needed for an education of children living in an industrial democracy.

However, from the point of view of the evaluation of the origins of elementary school science, object teaching made a significant contribution to the development of techniques which were utilized in a long list of research studies from 1920 to the present time. These studies were instrumental in the selection and evaluation of the purposes of elementary school science and in analyzing these purposes into component learning elements. Beginning in the 1930's, these techniques have been adapted more intensively to use in the study of behavior as related to learning in science and to experiential meanings.

Object Teaching Wanes

As the interest in object teaching waned and emphasis again became more specifically directed to the nature of content, a strong demand for science in the elementary school program became evident. Following the depression of 1873, the schools were severely attacked as the pinch of taxes made the citizens ask what they were getting for

their money. There was scarcely an educational journal of that day that did not carry at least one article pleading for more science in the school program. The chief emphasis during this period was in terms of giving a wider knowledge and understanding of the rapidly increasing science and technology.

The attempts to formulate an elementary school science curriculum met with a clash of points of view. Changes were occurring in the social and economic patterns which tended to influence the accepted purposes of an educational program. There were also changes in psychology which brought about changing conceptions as to the nature of the learning process.

Materials for pupil use and teacher planning were not common until nearly the end of the 19th century. Such leaders as G. Stanley Hall and Colonel Francis W. Parker furnished a general philosophy of education which strongly supported the study of nature and provided opportunity for others working under them to experiment and work out detailed programs, as did Wilbur S. Jackman and Henry H. Straight under Parker and Clifton F. Hodge under Hall. Others translated philosophy and educational theory into specific details of a program, as did William T. Harris and Charles, Frank, and Lida Brown McMurray.

Parker's Influence

The great influence of Parker came from his desire to use science as a unifying principle for the elementary school curriculum and his support of the work of Jackman and Straight along this line at the practice school of the Cook County Normal School, later Chicago Institute, and finally the School of Education at the University of Chicago.

Harris prepared the first detailed and extensive elementary science curriculum which offered specific help to teachers. This curriculum represented an organization emphasizing the subject matter of the science as a guide to organization within a framework suggested by educational theory.

To Jackman belongs the distinction of being the father of modern elementary science. His point of view in regard to both children and science corresponds remarkably to our recent conceptions. Much of Jackman's writing indicates a positive and dynamic view of children rather than the negative ideas so prevalent in the latter part of the 19th century. He was the author of the third yearbook (1904) of the National Society for the Scientific Study of Education later known as the National Society for the Study of Education. This was the first yearbook of this society that was devoted to the problems of the teaching of science. Jackman represents the connecting link between the early writers of children's literature and the modern elementary science. He laid the basis for the developmental approach of elementary school science in the closing years of the 19th century and the first decade of the 20th century.

Nature Study

About the same time, there came into the picture of science education a new phase known as the nature study movement. This movement obscured the contributions of Jackman for a time. Nature study, like object teaching, was an intrusion in the development of elementary science. However, in judging nature study, those interested in elementary school science should realize that there were many points of view of nature study and the leaders of nature study were in continuous debate. Nature study may be thought of as a movement in two senses. First, it may be considered part of a broad and general development resulting from the combined influences of Romanticism and the "new" education. Second, it may be thought of more specifically as a school program initiated and largely directed by Dr. Liberty Hyde Bailey and his associates at Cornell University. In either case one must think of nature study as a development of great vision. Bailey and many others involved in the nature study movement were men of high purpose. Furthermore, it must be said that the nature study movement was an American movement. It was homespun. It carried with it many of the ideals and thinking of the frontier. The main purpose of the nature study movement was a utilitarian one, namely, to improve agriculture and to overcome the desire of farmers' children to leave the farm for the city. Mrs. Anna Botsford Comstock, in the preface to one edition of her remarkable book, *Handbook of Nature Study,* which ran through edition after edition beginning in 1911, states that the nature study movement began during the depression of 1891-1893 in an attempt to prevent young people from migrating from the farms to New York City, thus adding to already crowded relief rolls.

From the beginning, the Cornell group recognized the importance of teacher education. The publications of Bailey, Mrs. Comstock, and others were among the most courageous and most comprehensive attempts at teacher education in the

field of science education that have ever been undertaken.

Prior to 1870, elementary science was the commonly accepted term used to designate science work in the elementary school. By 1900, nature study had become the accepted term. During the ten-year period of transition the two terms were used more or less interchangeably and synonymously. Because of the extreme formalism to which science teaching had gone in the elementary school, leaders in the educational reform chose the term "nature study" as a means of setting up their program as different from, or opposed to, the formalism associated with the earlier elementary science. This division of opinion as symbolized by choice of terminology is seen to rest upon (1) differences in meaning carried by the term "science," and (2) a difference in underlying philosophy as to the nature of "truth" and how it is secured.

Nature study received much criticism almost from its inception. The most valid and significant of these criticisms were directed towards its emphasis upon incidental items, its lack of organization, its limitation of children's capacity to reason, and its extravagant claims for aesthetic and emotional values.

Diversity and Extremes

In the nature study movement, statements of purpose are characterized by wide diversity and extreme comprehensiveness. Such statements carry no suggestion of the content and method by means of which the purposes are to be achieved.

Assumptions as to the nature of children's interests and their part in motivating learning led to the assumption that the immediate and casual interests of children should be the guiding factor in the selection of what is to be studied. Nevertheless, the details of programs as given in nature study manuals reveal that the organization of the specialized sciences was an influential factor in the selection of materials and methods of presentation.

Continued emphasis on firsthand observation and "nature, not books" led in practice to seasonal organization of materials, theoretical emphasis on field trips and out-of-door nature experiences, and identification as an end in itself. In spite of this emphasis (in theory) on firsthand experience, much of the material classified as nature study was in the form of reading materials and stories about nature, and a great deal of this was fable, myth, and fairy tale.

Although theoretical discussion usually advocated a well-rounded program including the physical sciences, in practice nature study came to be considered as treating almost wholly with biological nature. This was probably owing to the greater ease with which such materials could be obtained and handled by teachers untrained in science, and to the fact that those most interested in introducing nature study into the schools were largely specialists in the biological sciences.

More Nature Study

Nature study was largely the development of specialists in science and was not properly designed for the classroom. The earlier elementary school science movement was guided by men such as Jackman who not only were specialists in the field of science but were experienced teachers of children.

Nature study was also constructed on the basis of faculty psychology and serial development. The outlook on children was a negative outlook in that the leaders were prone to think of the child in terms of his limitations rather than his potentialities.

By the 1920's, it was quite evident that nature study was not succeeding in the elementary school. As we have said earlier, new attempts were made to design a curriculum in science. In the writings of Jackman, Dewey, and Kilpatrick were bases for a new outlook on science and children. The material in the present day elementary science curriculum is better designed for children and classroom teachers than was that constructed in Jackman's time. This, of course, would be expected because some 40 years have rolled around since the peak of Jackman's writings, and hence the human race has had more experience with science and the meanings of science.

Chapters of Interest

One of the chapters of interest in the development of elementary science relates to pressure groups. In the earlier periods there was pressure from various theologians to prescribe denominational science for children. There was also an urging for the development of a natural theology. There is much less of this kind of pressure in evidence today.

There have been other pressure groups such as humane societies, temperance societies, and more recently the aviation industries. These interests are not all to be condemned, except in so far as they seek to force the school to distort its purpose.

For almost two centuries it has been recognized that science is essential to the education of children

(Please turn to page 37.)

TV CLASSROOM: Science in Review

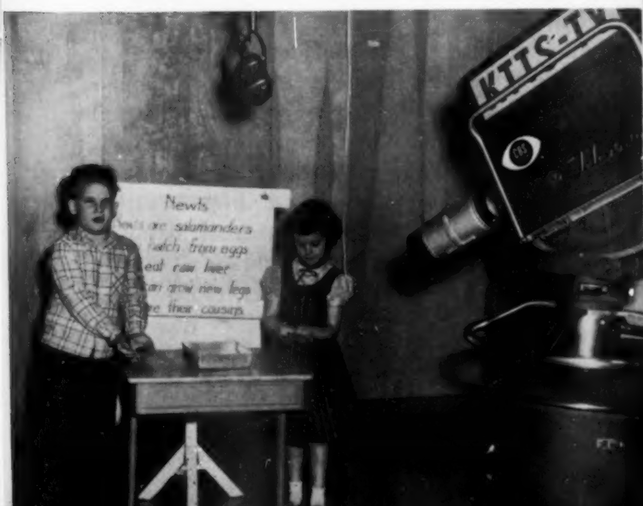
Television literally clasped hands with the public schools of Springfield, Missouri when TV arrived nearly four years ago in this Ozarks area. That was March 1953. On the first night of programming on Springfield's first local TV station, KTTS-TV, a *Television Classroom* program—a film program from the school system's curriculum library—was seen.

In the following months, *Television Classroom* developed a new weekly format, presenting activities of Springfield school children as they carry them out themselves. R. C. Glazier, director of public information for the Springfield Public Schools, originated and named the series, acting as the producer-director-narrator. During the initial three years, this public service program covered virtually every curriculum area and grade level from one through 12 and presented student casts from all 36 units of the school system. The school television production staff total was 1000 staff members and more than 15,000 students.

A variety of *Television Classroom* programs demonstrated that science study begins early in the Springfield Public Schools. Three of the photographs on this page are scenes from the popular *Science in Review*, as presented by Springfield's Phelps Elementary School last January. Top right is "Snow Fun." At bottom left is "Newts;" bottom right, "Water." Center right, a scene from the "Air Age" program, in which Doling School firstgraders discussed in an elementary fashion the theory of flight.

Loan copies of the science program scripts may be requested from the Office of Public Information, Springfield Public Schools, Springfield 2, Missouri.

PHOTOGRAPHS BY JOHN R. MCGUIRE



SCIENCE TEACHING

with modern facilities

By MAHLON BUELL

Department Chairman, Physics and Photography, Ann Arbor, Michigan, Senior High School

SCIENCE teaching at Ann Arbor (Michigan) High School is currently being stimulated through the use of the excellent facilities of a new building. For the past ten or more years, the enrollment in science classes has been increasing at a more rapid rate than the total school enrollment has increased. Now, with expanded and improved facilities, this rate of increase is being accelerated. Approximately 53 percent of the 1525 pupils who are enrolled in the three upper high school grades are taking one or more science courses this semester.

Ann Arbor High moved into the new building in April 1956. It is actually five buildings which are connected by corridors and tunnels for easy access to all departments.

The Building

The central building, which is a three-level structure, houses the traditional academic departments, the cafeterias, a recreation room, the administrative offices, and a clinic. This building is flanked by the library, the home economics department, and the industrial arts area on one side, and by the facilities for physical education, instrumental and vocal music, speech, radio and dramatics, and auditorium activities on the other.

The science department occupies nearly all of the first level of the main academic building. If placed end to end, the classroom, laboratories, offices, storerooms, greenhouse, planetarium, and observation deck would reach the length of a football field and two thirds of the way back. To supplement its indoor quarters, the department is fortunate in having for its use outdoor areas of considerable variety and extent.

The Staff and Curriculum

The teaching staff consists of the equivalent of seven full-time teachers who instruct a total of 33 classes. The solid core of the science curriculum is provided by college preparatory courses in biology, chemistry, and physics, which follow the standard patterns for such instructions. Also at the college preparatory level, physical science is offered for seniors who probably will take a minimum of science in college. Senior science is the course offered for students in the general curriculum who do not intend to go to college.

To enrich the curriculum and to meet other student needs and interests, five other courses are offered. These are photography, horticulture, conservation, astronomy, and meteorology. In each of these areas special facilities and equipment are provided.

Facilities for College Preparatory Courses

The biology department offers two full-credit courses which meet daily throughout the year. Elementary biology is for sophomores only and is chosen by students who wish to major in science and by others who use it as an elective. The other biology course is for juniors and seniors who usually are college bound but are not primarily interested in science. This semester there are eight classes in elementary biology and four classes in senior biology. Between 25 and 30 students are enrolled in each class.

Each of the three biology classrooms is equipped with 15 five-foot student tables, a large demonstration desk, a teacher's desk, darkening drapes, projection screen, book shelves, chalk board, tack board, lighted display cases, and shelf and sink for aquaria. Hot and cold running water, gas, electricity, and compressed air are provided at suitable and convenient locations. Each student is assigned a large storage shelf for his individual use. Microprojection booths provide for the projection of slides without darkening the entire room. Two smaller rooms provide office and work space for teachers, and storage facilities for supplies and equipment.

A plant room is located on the south side of the building with an entrance from the workroom between two biology rooms. It is equipped with plant benches on three sides and a sink and potting bench on the building side. It has its own thermostat for heat control and an automatic ven-

This recent aerial photograph of Ann Arbor High School shows the layout of the modern five-building structure, linked by corridors and tunnels. Far left is the industrial arts building; far right, the instrumental music facilities.

tilating device. The sink is provided with a spray device so that the plants may be spray-watered with either cold or warm water.

Outdoor facilities are spacious and conveniently close to the building. There is a 12-acre oak-hickory woodlot which provides shelter and food for wildlife as well as an opportunity for students to learn some principles of forestry and ecology. Adjoining the woodlot is a large field, formerly heavily grazed, but now growing up in crataegus which provides some wildlife food and shelter. Much of the remaining field area is covered with high grass and it supports, among other things, a large pheasant population. A small natural pond also adds to the usefulness of the area both to wildlife and to students.

Future development plans for the area include ecology trails, plantings of a variety of trees and shrubs, and the building of an artificial pond. The over-all plan is being developed with the professional assistance of men from the Soil Conservation Service, the State Game Division, and the County Forester's Office.

Chemistry and Physics

Chemistry is elected largely by college preparatory students in the eleventh grade. There are currently six classes of about 26 pupils each. In common with other academic classes, all science classes meet for five 55-minute periods per week. The chemistry and physics teachers have paid laboratory assistants who work about one hour each day.

The chemistry classroom has elevated seats and is connected to the laboratory by a storage-office room. Another small, ventilated, fireproof room is used for the storage of volatile and corrosive materials. The laboratory accommodates a class of 32 students who work at four large laboratory style tables. Chem-Rock table tops and tile floors will give many years of service. Hot and cold water, compressed air, and gas outlets are conveniently located. Two large fume hoods are available for student use and additional ventilation is provided by an exhaust fan which removes fumes through an opening at floor level.

An emergency eyewash fountain and shower, an electric still which provides water at the rate of three gallons an hour, a balance case with seven chemical balances, a cabinet of catalogued supplemental reading material, and two study tables all contribute to the efficient operation of the laboratory.

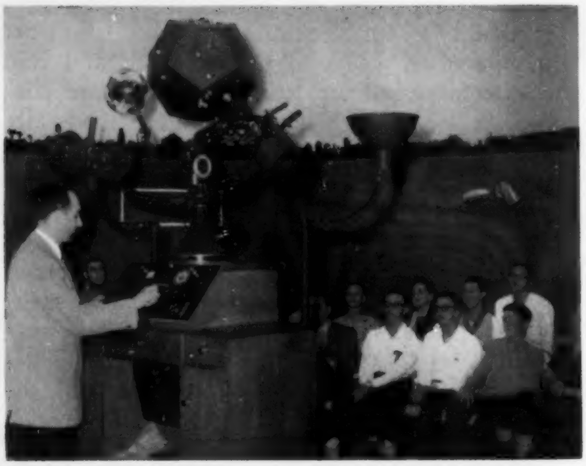
Physics is elected almost entirely by college preparatory seniors, many of whom have previously studied biology, chemistry, and three years of algebra and geometry. Many also elect solid geometry and trigonometry along with their physics. These elections make these students a highly selective group who are capable of doing good work. At the present time, about 105 students, or about one-fourth of the senior class, are enrolled in four physics classes which are all taught by the same teacher.

The classroom, which is separate from the laboratory, has the same general facilities found in the chemistry classroom. The laboratory is equipped for a maximum of 30 pupils who work at 15 tables. All tables are serviced with gas and both AC and DC electric outlets. The direct current is supplied by a rectifier unit at any voltage up to 60. Storage cabinets which are built into the walls along one end and half of one side of the laboratory provide room for much equipment. A cabinet containing 18 tote trays is very convenient when the equipment being used is small.

Between the physics classroom and laboratory is a large, combination office-storage-preparation room with cabinets and drawers for complete demonstration and laboratory equipment. Large windows provide an abundance of daylight in all rooms, but this can be excluded when desired by means of darkening drapes. Acoustical tile on the ceilings reduces noise in all rooms.

It is apparent that the chemistry and physics facilities are of the traditional rather than the multipurpose type. It is felt that they are more like those with which the students will work in college science courses.

Physical science, a course for college preparatory seniors, is taught in a combination classroom and laboratory. Most of the apparatus, supplies,



John Rosemergy instructs a class in the Argus Planetarium, a unique facility in the new Ann Arbor High School.

and materials for this course are borrowed from the other science laboratories, but a stock of the most often used equipment is being built up.

Facilities for Non-college Preparatory Courses

Senior science is a course for students in the general curriculum. It is a combination of both biological and physical science. Two classes in senior science and three classes in physical science share in the use of the facilities of one room. These facilities are similar to those found in the physics laboratory.

Photography is taught in the physics classroom and the photography laboratory. A film processing darkroom, a contact printing and enlarging darkroom, and a room for taking, finishing, and mounting pictures provide working facilities for a class of from 20 to 25 pupils. Other equipment available for student use includes about ten cameras of all sorts, many developing tanks, seven contact printers, nine enlargers, two print washers, two print dryers, many tripods and lights, and various other accessories.

Astronomy is an enrichment type course which provides one quarter of a unit of credit per semester because the class meets only on alternate days. In common with horticulture, meteorology, and conservation, it must be added to a student's program and may not be a substitute for one of the four half-credit courses which are required of all students at all times.

Two special pieces of equipment for astronomy have made the course very popular this year. They are a four-inch refracting telescope with equatorial mount, and a planetarium. The telescope is housed in a closet in the clock tower and must be moved out onto the observation deck for use. Since the instrument is very heavy, plans are being made to provide a permanent mounting with suitable shelter for it on the deck.

The Argus Planetarium is probably the most unique facility of the science department. A $10,000 gift from Argus Cameras, Incorporated, whose offices and factory are located in Ann Arbor, made it possible to equip the planetarium with a Spitz projector, a 24-foot hemispherical dome of canvas, an orery, 63 theater-type seats, and a high fidelity record player.

This wonderful instructional instrument is receiving increasing use by the astronomy classes, other science and non-science classes from the high school, classes from other local and surrounding area schools, and adult groups. One science teacher is given time and responsibility for scheduling the use of the planetarium and for doing most of the lecturing. He also instructs the astronomy classes. Groups who are not from the Ann Arbor public schools pay a $5 fee for a planetarium visit and lecture. This past Christmas, a senior student presented a very fine demonstration-lecture there.

Meteorology is being taught for the first time this semester. Observations of weather conditions and reading of the instruments are taken daily by the students who make a report and forecast over the school public address system. Among the instruments used in this course are an anemometer, a wind vane, a rain gauge, a sling psychrometer, and maximum-and-minimum thermometers, which are kept on the roof of the academic studies building. The physics laboratory houses the barograph, mercurial barometer, cloud chart, and wind-direction and velocity-indicating instrument. A continuous daily record is being kept of such elements of the weather as precipitation, high and low temperatures, relative humidity, visibility, wind direction and velocity, and atmospheric pressure.

The horticulture and conservation classes share with the biology classes the use of the plant room and the outdoor facilities. The content of these courses is determined largely by the background and interests of the pupils and teachers.

This science program requires the services of competent teachers who are qualified in several fields. Such teachers are in short supply and sometimes hard to retain. The school administration has been very cooperative in helping to provide equipment and teacher time, especially as they relate to the laboratories, greenhouse, weather station, and planetarium. Visiting science teachers and others are welcome at any time.

SESQUICENTENNIAL OF THE COAST AND GEODETIC SURVEY

A Report on 150 Years of Technical Services

THE Coast and Geodetic Survey, one of the oldest of Federal Government technical bureaus, is celebrating its 150th anniversary during 1957. It was on February 10, 1807, that the Congress authorized a survey of the coast of our country and its off-lying islands.

In implementing this act, President Thomas Jefferson enlisted the advice and assistance of the American Philosophical Society which had been founded by Benjamin Franklin. Of the many plans considered—one of which was submitted by James Madison—, President Jefferson selected the plan of Ferdinand Hassler, a Swiss engineer and mathematics professor at West Point.

The program for conducting the surveys and the high standards of accuracy prescribed have continued through the years. As a result, the Coast and Geodetic Survey has produced a system of control surveys, accurate nautical and aeronautical charts, tidal and current information, geophysical data, and related technical knowledge which have contributed significantly to the scientific lore of our country.

The need for the early surveys of our shoreline became one of the first concerns of our Republic after it had been established. Marine commerce with the countries of Europe was vital to the development of our nation.

When gold was discovered in California in 1848, the same year that the territory was acquired from Mexico, a new interest in the activities of the Coast and Geodetic Survey developed. Not only were new charts needed for the greatly increased marine commerce of the Pacific Coast, but it was desirable to tie our eastern and western seaboards together in order to determine the exact size of our nation. An arc of precise triangulation stations furnishing exact latitude and longitude positions along the 39th parallel was completed in 1895.

This is the familiar bench mark.

Control surveys of Canada and Mexico were connected to this datum in 1913 by international agreement. The datum station for this vast area of geodetic control is triangulation station *Meades Ranch,* located 12 miles north of Lucas, Kansas. It is very near the geographical center of the United States and is the reference point for all property lines and city, county, state, and international boundaries on the North American continent. There are more than 150,000 such triangulation stations, which are easily distinguished by round bronze markers located over the United States at prominent and useful locations. Similarly there are over 400,000 bench marks distributed through out nation. These bench marks furnish the exact elevation above the mean level of the surface of the sea.

Field parties of the Coast and Geodetic Survey have carried on surveying operations in all territories of the United States. They began operations in the Philippine Islands in 1901 shortly after the War with Spain and continued the work until World War II. The program now is conducted by the Bureau of Coast and Geodetic Survey of the Philippine Islands. It is significant to note that of all the areas of military operations in the Pacific theater during World War II, the charts of the Philippine Islands were by far the most complete and accurate.

Field operations were begun in Alaska in 1867, even before that territory was purchased from Russia. The mapping of this vast area, approximately one fifth the size of the United States, still continues to be one of the major projects of the bureau.

In completing 150 years of public service to the nation, the Coast and Geodetic Survey is proud of its accomplishments in surveying uncharted waters and mapping virgin territory throughout our country and its territories. The surveys executed and the charts produced safeguard life and commerce and also provide the facts needed in planning many activities of our nation.

Summer Institutes, Conferences, and Fellowship Programs for Science Teachers

An NSTA Staff Report

An expanding number of summer programs are now being made available to science teachers, offering fellowships or stipends through which teachers may take the opportunity to study new teaching techniques as well as industry's adaptation of advances in science. The following summary of summer opportunities for science teachers, listing information received at magazine press time, is printed in *The Science Teacher* as a professional service.

In addition to these institutes sponsored mainly by industry and private foundations, the National Science Foundation is supporting similar institutes with nearly 100 grants this summer, for college as well as high school science and mathematics teachers in educational institutions throughout the country. A brochure announcement of the NSF institutes has been mailed to all NSTA members. Copies of the announcement may also be obtained by request from *J. A. Campbell, Program Director for Summer Institutes, National Science Foundation, Washington 25, D. C.*

The following listings give the name of the institution offering the program, dates, name of program and/or special features, limitations if any, stipends and sponsor, contact person for additional information, and closing date for applications.

Agricultural and Mechanical College of Texas. June 17-August 2. A six-semester-hour-credit course in physics and a three-credit course in mathematics for physics teachers with special background requirements. Also, if sufficient subsidy is obtained, special three-credit courses in several sciences for teachers with less background and especially for junior high school general science teachers and elementary science supervisors. $500 (tentative figure) fellowships from industries interested in Texas technical manpower. *J. G. Potter, Physics Department, Texas A & M, College Station, Texas.*

Case Institute of Technology. June 16-July 26. General Electric Science Fellowships for high school and preparatory school teachers of physics (grades 9-12). Special courses on "Basic Concepts in Physics," "Recent Developments in Atomic and Nuclear Physics," and "Science and Technology in the Control of Environment." Seven units of graduate credit may be earned. Open to teachers from Illinois, Indiana, Iowa, Kentucky, Michigan, Minnesota, Missouri, Ohio, Western Pennsylvania, Tennessee, West Virginia, and Wisconsin. Fifty all-expense fellowships providing tuition, fees, board and lodging, and round-trip transportation. *Dean Elmer Hutchisson, Case Institute of Technology, University Circle, Cleveland 6, Ohio.* March 16.

Case Institute of Technology. Special courses for high school and preparatory school teachers of mathematics (grades 9-12) on "Elementary Mathematics from an Advanced Viewpoint," "Basic Concepts in Mathematics," and "Digital Computing Methods." Six units of graduate credit may be earned. Thirty all-expense fellowships (plus $100 incidentals allowance) provided by the du Pont Company. *Dean Elmer Hutchisson, Case Institute of Technology, University Circle, Cleveland 6, Ohio.*

Cornell University. July 1-August 10. Shell Merit Fellowship Program. A specially designed program for chemistry, mathematics, and physics teachers and supervisors, providing seminar type courses, lectures, field trips, and informal discussions with leading scientists, mathematicians, and educators. The program will also offer opportunities to carry out special projects relating to classroom instruction and pointing toward leadership efforts in the community. About 45 $500 fellowships to help compensate for the loss of summer earnings, plus tuition, book fees, board and lodging, and travel allowances, provided by The Shell Companies Foundation, Inc. *Dr. Philip G. Johnson, Stone Hall, Cornell University, Ithaca, New York.* Fellowship nominees to be notified by March 1.

Future Scientists of America Foundation of the National Science Teachers Association. June 23-July 6. 1957 West Coast Summer Conference for High School Chemistry Teachers. A program of lectures, seminars, demonstrations, and field trips, designed to help chemistry teachers increase their knowledge of advances and opportunities in the field of chemistry. Conference will be held at San Jose, California, State College in cooperation with San Jose State College and the Crown Zellerbach Foundation. Open to high school teachers in Washington, Oregon, California, Idaho, Arizona, Nevada, and Utah. Forty $200 fellowships available. *National Science Teachers Association, 1201 Sixteenth Street, N.W., Washington 6, D. C.*

Harvard University. July 1-August 14/21. Special courses for teachers of grades 7-12 on "Recent Developments in Physical Science" and "Teaching Science," ending August 14. Twenty $400 fellowships plus tuition fees, provided by the du Pont Company. Also National Science Foundation fellowships for a course on "A Special Program in Nuclear Science and Biology," ending August 21. Eight units of credit may be earned. Enrollment not limited to fellows. *Professor Fletcher Watson, Harvard University Summer School, Weld Hall, Cambridge 38, Massachusetts.*

Howard University. June 17-August 9. Special program for secondary school science and mathematics teachers. Six semester hours of graduate credit may be earned. Twenty-four $250 fellowships provided by the Phelps-Stokes Fund of New York; no tuition, no fees. *Professor Herman Branson, Department of Physics, Howard University, Washington 1, D. C.*

Oak Ridge Institute of Nuclear Studies. July 29-August 23. Summer Institute for Secondary School Physical Science Teachers. Features classical and modern physics, chemistry, science experiments, science teaching methods, radioisotope techniques, and related subjects. Stipends of $300 plus allowances for dependents and travel for 48 participants. Sponsored by the National Science Foundation in cooperation with the Atomic Energy Commission. *Dr. Ralph T. Overman, Chairman, Special Training Division, Oak Ridge Institute of Nuclear Studies, P.O. Box 117, Oak Ridge, Tennesse.* April 1.

Ohio State University. June 17-August 30. Summer Program for Science and Mathematics Teachers, designed for experienced teachers who are admitted for graduate study. Courses to be distributed between academic and professional fields and will include a common seminar on "Problems in Teaching Science and Mathematics." Fifteen hours of graduate credit given. Sixteen $600 and registration fee fellowships provided by the du Pont Company. *Professor John S. Richardson, Department of Education, 208 Communications Laboratory, The Ohio State University, Columbus 10, Ohio.*

Stanford University. June 23-August 18. Shell Merit Fellowship Program. (See description for Cornell University.) About 45 fellowships open to science and mathematics teachers and supervisors residing west of the Mississippi. *Dr. Paul DeH. Hurd, School of Education, Stanford University, Stanford, California.* Fellowship nominees to be notified by March 1.

Syracuse University. June 16-July 26. General Electric Science Fellowships for secondary school physics and chemistry teachers. Special courses on "Organic Chemistry and Life Processes," "Laboratory Practices in Chemistry," "Electronics and Electrical Properties," "Concepts and Theories in Physics," "Introduction to Modern Physics," and "Seminar in the Physical Sciences for Teachers." Seven hours graduate credit given. Fifty all-expense fellowships (tuition, fees, board and lodging, round-trip transportation) for teachers from Arizona, California, Colorado, Idaho, Kansas, Montana, Nebraska, Nevada, North Dakota, Oregon, South Dakota, Utah, Washington, and Wyoming. *Dr. A. T. Collette, Chairman, Director of Science Teaching, Syracuse University, Syracuse, New York.* March 1.

Teachers College, Columbia University. July 8-August 16. Program for in-service high school science teachers acceptable as graduate students. Sixteen $400 and tuition fee fellowships provided by the du Pont Company. *Professor Frederick L. Fitzpatrick, Teachers College, Columbia University, 525 West 120 Street, New York 27, New York.* March 1.

Union College. June 25-August 2. General Electric Science Fellowships for secondary school teachers of physics and chemistry. Special courses on "Topics in Modern Physics and Chemistry," "Modern Chemistry in Theory and Experiment," "Topics in Electricity and Modern Physics," and "Chemistry and Physics in Industry." Eight units of graduate credit may be earned. Fifty all-expense fellowships (tuition, fees, board and lodging, round-trip transportation) for teachers from the New England States, New York, New Jersey, Pennsylvania, Delaware, Maryland, Virginia, North Carolina, and the District of Columbia. *Committee on General Electric Fellowships, Union College, Schenectady 8, New York.* March 1.

University of Minnesota. June 17-August 9. Three special courses for 75 secondary school teachers in physics, mathematics, and chemistry. It is anticipated that a three-summer sequence of courses will be available, permitting a teacher to cover a variety of areas in the three sciences. Credit toward a master's degree may be earned. Stipends of $600 plus allowances for travel and dependents provided by the Hill Family Foundation and the National Science Foundation. *Professor J. W. Buchta, Professor of Physics, University of Minnesota, Minneapolis 14, Minnesota.*

Classroom Ideas

Physics

An Apparatus for Preparing Specific Gravity Specimens

By ROBERT G. DOTY, Canby, Oregon, Union High School

One of the more common materials used in demonstrating the specific gravity of solids is paraffin. However, convenient size specimens of this material are not available from commercial sources and the production of suitable samples for student use presents a problem.

Our solution to this problem is the apparatus illustrated in Figure 1. Form A is made of one half of the cardboard center tube found in toilet tissue rolls. Base B is made of any handy wood scrap material, B-1 being drilled to allow a tight fit of A and B-2 being solid except for a small hole centered below the circular cutout of B-1. C is a loop of light wrapping twine.

fig. 1

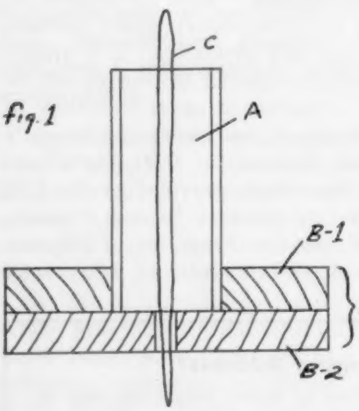


fig. 2

In use, the twine loop is passed through the hole in B-2 and Form A is put in place. The loop is then suspended at its upper end, B is floated on cool water, and the lower loop end is stretched by means of a suitable weight which keeps the loop strands parallel with the sides of the form.

Melted paraffin is now poured into the form, in small increments, and allowed to cool. When the form is completely filled, it is removed from the wooden base. (We have found that holding B-1 and B-2 together with bolts and wing nuts permits their easy separation in the event that the paraffin-filled form refuses to leave the base, and must be pushed out.)

The ends will be concave and this is corrected by the addition of more paraffin. When the ends are squared off, cut off Form A with a razor blade and the result will be a specific gravity specimen as shown in Figure 2.

General

A Suggestion for Motivation in Science Classes

By IDA M. HILL, Alice Deal Junior High School, Washington, D. C.

For the past two years I have been using a form on which my ninth-grade general science classes may report their extra scientific activities each advisory. I have found this plan so successful that I should like to tell other teachers about it. The report on extra activities is entirely voluntary and I give one mark during the advisory on the extra activity sheet. The students ask for the sheet if they wish to make a report.

The value of the sheet lies in the fact that it encourages supplementary reading, observing, experimenting, class participation, and group work. It is also a means by which students may make known some of their problems and successes which may not otherwise be reported.

In case a student has not done very much, I return the sheet and ask that more be done the next advisory.

I was curious to know if my students would make a report on their extra activities if no mark was given. I asked such a question on my last test. Many students said they would do the extra work if no mark was given, but, of course, several said the mark was an incentive to do extra work.

(Please turn to page 35.)

The New Direction in Science Educati

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"Those who plan must consider long-range requirements — the demands that will be placed upon facilities for the next 20-30-40 years — as well as immediate needs. They must evaluate their objectives and include such facilities as will enhance their achievement. To provide equal opportunity in large schools and small schools, single rooms must be planned to serve all sciences in consecutive periods, or some in alternate years; suites of two rooms, perhaps, for the biological and physical sciences; rooms to serve a single subject; whole school plans which provide single purpose and multi-purpose rooms to care for fluctuations in need and enrollment without loss to a single child. All these must be planned without loss of a single function in a subject area, without loss of a single advantage in relation to the learning process; and without loss of any function contributive to the total program of the school."

— Excerpt from "Science Education For All The Students," published and copyrighted by E. H. Sheldon Equipment Co.

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Nominees for NSTA Officers and Directors for 1957–58

The following biographical sketches are brief summaries of the careers and activities of the nominees. They include, in this order: present professional connection; degrees; key past positions; activities; publications; honors; and hobby interests.

A report on the Elections Committee, which made the final selections of the nominees, appears on page 39 of this issue of *TST*. As stated there, ballots—now being mailed to all NSTA members—must be returned, postmarked no later than March 10, to the committee chairman, Madeleine T. Skirven, Eastern High School, Baltimore 18, Maryland.

For President-Elect

HERBERT A. SMITH. Professor of Education and Director, Bureau of Educational Research and Service, University of Kansas, Lawrence. BS, MA, PhD, University of Nebraska. Science teacher, Nebraska high schools; superintendent of schools, West Point, Nebr.; assistant professor and supervisor of science, University of Nebraska. NSTA Region VII Director; member, NSTA committees, chairman, Committee on Research; chairman, Science Achievement Awards program, Region VII. Numerous articles in *Science Education, Journal of Educational Research, The Clearing House,* other journals. Pi Mu Epsilon, Phi Delta Kappa, Brownell Scholarship in Science Education. Secretary, Section Q, AAAS. Reading, gardening.

ALBERT GUIDA

ZACHARIAH SUBARSKY. Head of Annex, Bronx High School of Science, New York City. BS, College of the City of New York; MS, PhD, Teachers College, Columbia University. Chairman, Department of Biology and Introductory Science, Bronx High School of Science. Secretary, NSTA; chairman, Nominating Committee, 1955. Articles in *The Science Teacher, Scientific Monthly, The Teaching Scientist, Education* (Boston). Fellow, AAAS; winner, American Society of Metals Award, 1952. Past president, New York Federation of Science Teacher Associations, Association of Chairmen of Departments in New York City; vice-president, Policy Consultation Committee, New York City Board of Education. Chamber music, nature study.

DOROTHY T. TRYON. Head, Science Department, Redford High School, Detroit, Mich. BS, MS (chemistry), Wayne University. Biology and chemistry teacher, Redford High School. Secretary, NSTA (two terms); NSTA Board of Directors (two terms); member, NSTA committees, including 1957 Convention Committee; local chairman for NSTA University of Michigan meeting, 1952. Articles in *Detroit Chemist, Metropolitan Detroit Science Review.* Past president, Metropolitan Detroit Science Club; former treasurer, Detroit Biology Club; member, NEA, Detroit Education Association, NABT, Detroit section of ACS; active in Michigan conservation programs. Photography, gardening, reading detective stories.

For Secretary

H. M. LOUDERBACK. Chemistry Teacher, Lewis and Clark High School, Spokane, Wash. AB (biology), Whitman College; MS (chemistry), State College of Washington. Science teacher for 25 years in Washington and Idaho high schools. NSTA Region VIII Director; NSTA Washington State Director; member, NSTA committees. Contributor to *Journal of the American Chemical Society.* Westinghouse Fellow, M.I.T., 1951; Crown Zellerbach Fellow, Oregon State College, 1956. Member, ASM, ACS. Hiking, football officiating.

MARTIN THAMES. Coordinator of Science, Chemistry and Physics Instructor, Bemidji High School, Bemidji, Minn. BS, University of Oklahoma; MA, University of Minnesota. Director of audio-visual instruction. NSTA National Membership Chairman, 1951-6; NSTA Minnesota State Director. Ford Foundation Scholarship, Institute of Physics, University of Minnesota; Phi Delta Kappa, Kappa Delta Pi. Past president, Northern Minnesota Science Teacher Association; director, Minnesota Junior Academy of Science Fairs. Fishing, photography, hi-fi.

KENNETH E. VORDENBERG. Supervisor of Science, Secondary Schools, Cincinnati, Ohio, Board of Education. BS, MEd, University of Cincinnati. Teacher of general science, physics, chemistry, radio. NSTA Board of Directors; member, NSTA committees, chairman, Convention Review Committee. Articles in *School Science and Mathematics;* editor, *Curriculum Guides in Electricity, Physics, General Science, and Radio.* General Education Board Fellowship, University of Chicago. Fellow, AAAS; member, NEA, OEA, Ohio Academy of Science. Phi Delta Kappa, Kappa Delta Pi. Reading, writing, horseback riding.

LODDER PHOTOGRAPHY

For Treasurer

CUTLER'S STUDIOS

BROTHER I. LEO. Associate Professor of Chemistry, St. Mary's College, Winona, Minn. PhD (chemistry), Catholic University of America. Registrar, St. Mary's College; dean, Christian Brothers College, Memphis, Tenn. Panelist, NSTA conventions; member, Planning Committee, 1955 National Convention. Articles in *Journal of Chemical Education, The Science Counselor, School Science and Mathematics, Catholic Educational Review, Catholic School Journal.* Chairman, Memphis Section, ACS. Rock and mineral collecting, touring chemical plants.

ROBERT T. LAGEMANN. Chairman, Department of Physics and Astronomy, Vanderbilt University, Nashville, Tenn. AB, Baldwin-Wallace College; MS, Vanderbilt University; PhD, The Ohio State University. Professor, Emory University; physicist, Manhattan District, World War II. NSTA Region III Director. Articles in *Scientific Monthly, The Physical Review, The Journal of Chemical Physics, Journal of Higher Education,* other journals. Treasurer, SE section, American Physical Society; past president, Georgia Academy of Science.

For Director, Region I

SEAWARD E. BEACOM. Associate Professor of Chemistry, Teachers College of Connecticut, New Britain, Conn. BS (chemistry), Mount Union College; MS (chemistry), University of Michigan; PhD (chemistry), University of Connecticut. Chemistry instructor, research chemist. Member, NSTA committees. Phi Lambda Upsilon, Sigma Xi. President, Connecticut Science Teachers Association. Athletics.

DOROTHY WESTGATE GIFFORD. Head, Science Department, Lincoln School, Providence, R. I. AB, Mount Holyoke College; AM, Brown University. NSTA Region I Alternate Director; special consultant, 1956 Summer Conference for Wisconsin High School Chemistry Teachers. Articles in *Journal of Chemical Education.* Past president, New England Association of Chemistry Teachers. Sigma Xi Award, Brown University. Collecting sea horses, bowling.

ROBERTS

CALVIN F. GRASS. Senior Instructor in Physics, New Hampshire Technical Institute, Portsmouth, N. H. BA, Boston University; MEd, University of Maine. Head of science department, Maine and New Hampshire high schools. Member, NSTA committees. Contributor to *The Science Teacher.* Westinghouse Fellow, Carnegie Institute of Technology. Organizer, North Country Science Teachers Association, N. H.

CLIFFORD R. NELSON. Junior High School Science Consultant, Weeks Junior High School, Newton Center, Mass. BS (education), MEd, Boston University. Science teacher, chairman of science department, Weeks Junior High School. Program participant, NSTA national conventions. Contributor to *The Science Teacher.* Charter president, Science Teachers of New England. House and cottage designing and building.

For Director, Region III

ANITA BICKFORD. General Science Teacher, Leland Junior High School, Chevy Chase, Md. BA, Hunter College; MA (June 1957), American University. Member, NSTA committees. Essay contest winner on ways of improving science teaching methods. Montgomery County (Md.) Scholarship for Graduate Study. Chairman, Montgomery County Science Fair Judging Committee. Girl Scout leader, PTA, music.

JOHN B. CHASE, JR. Assistant Professor of Education, University of North Carolina, Chapel Hill. AB, MA, University of North Carolina; EdD, University of Virginia. Science teacher, Wilmington, N. C. Member, NSTA committees, chairman, Planning Committee. Contributor to *The High School Journal,* other journals. Education chairman, Virginia Academy of Science; science consultant, American Social Hygiene Association.

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Depauw University	U. of Miami
Harvard University	U. of Michigan
Hillyer College	U. of Miss.
Johns Hopkins Univ.	U. of Missouri
Kansas State College	U. of Nebraska
Louisiana State Col.	U. of Rochester
Loyola University	U. of S. Dakota
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ST-O

FRANKLIN D. KIZER. Assistant Supervisor of Secondary Education, Virginia State Department of Education. AB, MA, East Carolina College. Virginia State Director, NSTA; member, NSTA committees. Shell Merit Fellow, Cornell University. Past president, Norfolk (Va.) County Science Supper Club, Secondary Science Teachers Section of the Virginia Education Association, and others. Gardening, photography.

DONALD C. MARTIN. Head, Department of Physics, Marshall College, Huntington, W. Va. BS, MS, Louisiana State University; PhD, Cornell University. Physicist, Raytheon Mfg. Co. Contributor to *The Physical Review, The American Journal of Physics.* National president, Chi Beta; past president, West Virginia Science Teachers Association, Appalachian Section of the American Association of Physics Teachers. Reading, traveling.

For Director, Region V

C. LEROY HEINLEIN. General Science Teacher, Audio-Visual Coordinator, Woodward High School, Cincinnati, Ohio. BS (education), University of Cincinnati; MS (education), Indiana University. Member, NSTA committees. Contributor to *The Science Teacher.* Phi Delta Kappa. Participant in Cincinnati television and radio science teaching programs designed in the public interest. Photography, fishing, travel.

EMILIE U. LEPTHIEN. Supervisor of Visual Education, Chicago, Ill., Board of Education. BS, MA, Northwestern University. Science script writer, Chicago Board of Education. Member, NSTA committees. Articles in *Metropolitan Detroit Science Review, Film News, Teaching Tools, Woman's Day,* other publications. Co-organizer and past president, Chicago Teachers Science Association. Photography, philately, writing.

LOUIS PANUSH. Head, Exact Science Department, Northeastern High School, Detroit, Mich. BS, AM, Wayne University. NSTA Magazine Advisory Board: panelist, NSTA national conventions. Contributor to *The Science Teacher, School Science and Mathematics, Journal of Chemical Education,* other journals. Editor and business manager, *Metropolitan Detroit Science Review* since 1943. Travel.

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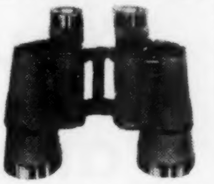

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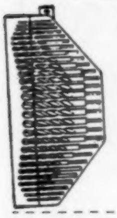

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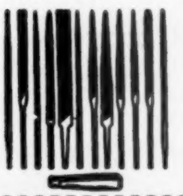

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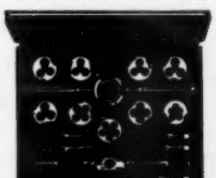

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Regulary Sold at $32.50 NOW **$12.95** plus 50c pp., hdlg.

Compact complete set of professional toolmaker quality. Made of high-quality tool steel throughout with hardened, tempered cutting edges. Pipe, machine screw, coarse threads all supplied up to ½". Set includes 1 tap and die in each of these sizes: 6-32, 8-32, 10-24, 12-24, ¼-20, 5/16-18, ⅜-16, 7/16-14, ½-13, die stock, adjustable wrench. Metal Case. A wonderful buy! Act now to make sure you don't miss out!

Also available: National Fine 20-pc. Tap & Die set. Contains 1 tap and die in these sizes: 6-40, 8-36, 10-32, 12-28, ¼-28, 5/16-24, ⅜-24, 7/16-20, ½-20, die stock, adjustable wrench. Metal Case.

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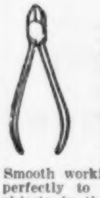

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FOR JEWELERS, OPTICAL WORKERS, HOBBYISTS, CRAFTSMEN OF ALL KINDS!

These superb German instruments are of deep-forged, heat-treated, high quality tool steel, fabricated to most exacting specifications. All-over ground and polished to smooth, hard surfaces. Smooth working joints with just the right tension. Jaws meet perfectly to safely and securely hold even the most delicate objects in the hard-to-reach corners and angles. Each plier is 4" long and a veritable gem of precision and strength.

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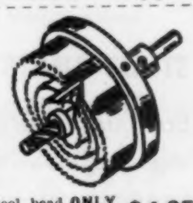

with exclusive new AUTOMATIC SLUG EJECTOR

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Fits any electric drill, drill press, lathe, motor. Automatic slug ejector pops out slug immediately. This saw works 3 times as fast as other hole saws that sell for twice as much! Cuts 1", 1½", 2" and 2½" holes cleanly, accurately. Cuts wood, plastic, metals, formica, wall board, etc. Has extra grooves in tool head to accommodate 1¼", 1¾" and 2¼" blades. Consists of sturdy alloy tool head, 4 finest quality shatterproof blades, automatic slug ejector and ¼" drill bit.

ONLY **$4.95** ppd.

DELUXE ARCO HOLE SAW—Same as above but has 7 blades, cuts 1", 1¼", 1½", 1¾", 2" 2¼" and 2½" holes.

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Reg. $42.50 NOW **$9.95** plus 50c pp., hdlg.

Another of Scott Mitchell's famous tool bargains! The original $42.50 price is right on the package, but you pay only $9.95! The reason? A large tool wholesaler needed warehouse room badly. So he closed out a large quantity of these high quality drill sets to us! A wonderful buy for advance hobbyists, carpenters, construction workers, factories, machine shops! Made of high quality, specially hardened steel, with turned down shanks to fit all ½" electric drills. Zip through hardwoods, aluminum, iron, plastics, even the toughest steel! Sizes ⅝", ¾", ⅞", 1". Come in numbered pocket, snap closure tool roll.

Extra Special! 11 Pc. Set. Reg. $99.50. NOW ONLY $29.95 plus $1 pp. hdlg. Same features as 4 pc. set. Sizes 9/16", ⅝", 11/16", ¾", 13/16", ⅞", 15/16", 1", 1⅛", 1-3/16", 1¼".

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Just snap this versatile tool into your ¼" electric hand drill or any drill press . . . it not only drills holes in seconds—but also acts as a saw! And as a router for making funnel shaped holes! Can be used on lumber, plyboard, plasterboard, masonite, leather, rubber, etc. Not for metal or masonry. Made from hi-grade tool steel, you'll find this is one of the most useful tools you ever had! Buy the set of 2 and save!

2⅝" long. ¼" dia. **$1.25** ppd.

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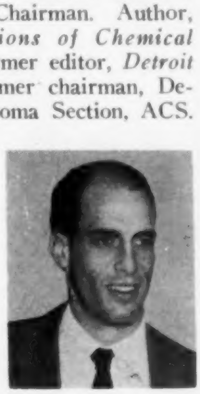

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• *The MODERN Electrostatic Generator*

THE CAMBOSCO GENATRON serves not only for classical experiments in static electricity, but also for new and dramatic demonstrations that are not performable by any other means. It exemplifies a modern method of building up the tremendous high voltages required for atomic fission, for nuclear research, and for radiation therapy.

Entirely self-exciting, the GENATRON cracks into action at the snap of the switch—whose only function is that of starting the motor drive. No auxiliary charging method is employed. Hence, despite an output measured in hundreds of thousands of volts, no hazard is involved, for the operator or for the observers.

An Output of 250,000 Volts—or More!

THE CAMBOSCO GENATRON is designed to deliver, in normal operation, a discharge of the order of 250,000 volts. That figure, a conservative rating, is based on many trials conducted under average conditions. With ideal conditions, a potential difference of 400,000 volts has been achieved.

Modern Design— Sturdy construction and ever-dependable performance distinguish the GENATRON from all electrostatic devices hitherto available for demonstration work in Physics. This powerful, high-potential source, reflecting the benefits of extensive experience in electrostatic engineering, has absolutely nothing but purpose in common with the old fashioned static machine!

NO FRAGILE PARTS—Durability was a prime consideration in the design of the GENATRON which, with the exception of insulating members, is constructed entirely of metal.

The only part subject to deterioration is the charge-carrying belt, which is readily replaceable.

NO TRANSFER BODIES—In all conventional influence machines, whether of Holtz or Wimshurst type, electrical charges are collected and conveyed (from rotating plates to electrodes) by a system of "transfer bodies." Such bodies have always taken the form of metal brushes, rods, button disks or segments—each of which, inevitably, permits leakage of the very charge it is intended to carry, and thereby sharply limits the maximum output voltage.

It is a distinguishing difference of the GENATRON that electrical charges, conveyed by a non-metallic material, are established ***directly upon the discharge terminal.*** The attainable voltage accordingly depends only upon the geometry of that terminal and the dielectric strength of the medium by which it is surrounded.

Unique Features of the CamboscO Genatron

DISCHARGE TERMINAL Charges accumulate on, and discharge takes place from, the outer surface of a polished metal "sphere"—or, more accurately, an oblate spheroid.

The upper hemisphere is flattened at the pole to afford a horizontal support for such static accessories as must be insulated from ground. A built-in jack, at the center of that horizontal area, accepts a standard banana plug. Connections may thus be made to accessories located at a distance from the GENATRON.

CHARGE-CARRYING BELT To the terminal, charges are conveyed by an endless band of pure, live latex—a CamboscO development which has none of the shortcomings inherent in a belt with an overlap joint.

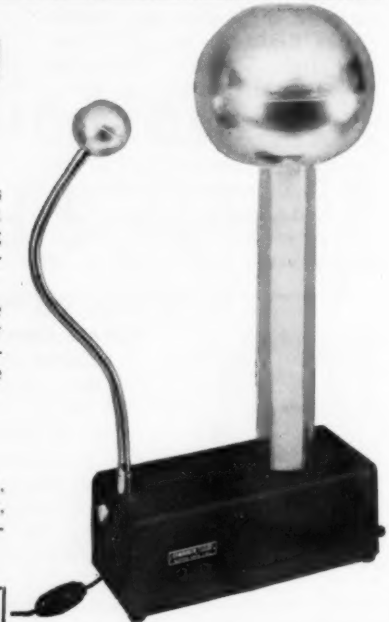
DISCHARGE BALL High voltage demonstrations often require a "spark gap" whose width can be varied without immobilizing either of the operator's hands.

That problem is ingeniously solved in the GENATRON, by mounting the discharge ball on a flexible shaft, which maintains any shape into which it is bent. Thus the discharge ball may be positioned at any desired distance (over a sixteen-inch range) from the discharge terminal.

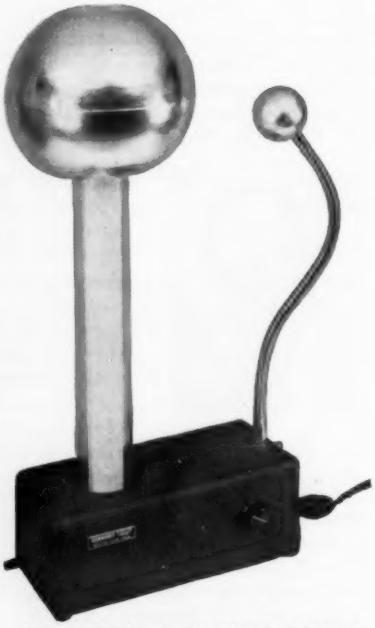
BASE...AND DRIVING MECHANISM Stability is assured by the massive, cast metal base—where deep sockets are provided for the flexible shaft which carries the discharge ball, and for the lucite cylinder which supports, and insulates, the discharge terminal.

The flat, top surface of the base, (electrically speaking), represents the ground plane. Actual connection to ground is made through a conveniently located Jack-in-Head Binding Post. The base of the Genatron encloses, and electrically shields, the entire driving mechanism.

PRINCIPAL DIMENSIONS The overall height of the GENATRON is 31 in. Diameters of Discharge Ball and Terminal are, respectively, 3 in. and 10 in. The base measures 5¼ x 7 x 14 in.



GENATRON, WITH MOTOR DRIVE
Operates on 110-volt A.C. or 110-volt D.C.
Includes: Discharge Terminal, Lucite Insulating Cylinder, Latex Charge-Carrying Belt, Discharge Ball with Flexible Shaft, Accessory and Ground Jacks, Cast Metal Base with built-in Motor Drive, Connecting Cord, Plug, Switch, and Operating Instructions.
No. 61-705 .... **$98.75**



GENATRON, WITH SPEED CONTROL
Includes (in addition to equipment itemized under No. 61-705) built-in Rheostat, for demonstrations requiring less than maximum output.
No. 61-708 .... **$109.00**

No. 61-710 Endless Belt. Of pure latex. For replacement in No. 61-705 or No. 61-708 **$3.00**

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HILL—continued from page 22

On the whole all answers were gratifying. Among some of the answers were such statements as:

"These sheets give us an incentive to do more than we otherwise might get around to."

"I like to do extra activity sheets because the extra activities are so interesting."

"I like to do extra activity sheets because it is fun to work on them. By doing them you learn more science in your spare time."

"I would do the extra work if it was something I was interested in, because I enjoy learning more about the world I live in."

"I would do extra activity things because it helps your knowledge and is a lot of fun and a thrill to understand what is going on, like in the planetarium at Philadelphia."

"Yes, to show you what I have done."

"Yes. It would help all my other work in science class to know extra things that the textbook doesn't give. It would also add interest for me to the class."

A copy of the extra activity sheet which my students use follows.

Name____________________

EXTRA ACTIVITY SHEET

1. I read the following book. Give title and author. Write a brief paragraph about the contents of the book on the back of the sheet.
2. I read the following articles related to the unit. Give the titles of the articles read and the source of the articles.
3. I participated in the following field trips. Give the place and date. On the back of this sheet give a summary of what you learned.
4. I did the following things, such as:
   a. Looked at a science program on television. Name the program.
   b. Listened to a science program on radio. Name the program.
   c. Had an interview with a scientist. Name the scientist.
   d. Watched a scientist, a mechanic, or other at work.
   e. Participated in a television or radio broadcast.
5. In relation to the unit being studied, I did the following things:
   a. Gave a report to the class. Give title of report.
   b. Gave a demonstration. Tell what was shown or proved.
   c. Maintained an exhibit. (Aquarium, terrarium, etc.)
   d. Worked on a committee. (Bulletin board, debate, project, etc.)
6. Of the many things I did this advisory the following stand out as being successful and happy; or unsuccessful and puzzling:
7. A problem with which I would like help is:
8. I feel that I have made progress during this advisory in the following ways:
9. I should like to offer the following suggestions for improving this unit of work.

CRAIG—continued from page 14

in a democracy. Various informal experimentations have been conducted to establish a suitable basis for the development of science in the elementary school program. Few of these experimentations prior to 1920 were supported by adequate research.

Some of the problems encountered in developing elementary science in the past have arisen from the fact that science in its modern aspects has been both novel and profound for adult society. The problem of selecting purposes and procedures for teaching and learning experiences of children has been a perplexing one. However, as mankind has learned more about science, it has become more intelligent about the role of science in elementary education.

Other difficulties have arisen from inadequate views of the abilities of children to interpret the events of the universe. The psychological thinking of much of the 19th and early 20th centuries was negative about children and tended to place limitations upon their potentialities for growth and development in understanding natural phenomena. Science was thought by many educators and scientists as beyond the comprehension of children in the elementary school. As a result, science in many elementary schools was relegated to a more casual or trivial place in the curriculum with an emphasis on its correlation with other elementary school subjects. Science became in many schools an incidental and accidental matter of little value to children or to society.

In recent years a more dynamic psychology of science education has been developed which recognizes the interpretation of the physical environment as a natural facet of child growth and development.

Selected References

A Half Century of Science and Mathematics Teaching. Central Association of Science and Mathematics Teachers, Inc., Oak Park, Ill., 1950.

Hindle, Brooke. *The Pursuit of Science in Revolutionary America, 1735-1789*. The University of North Carolina Press, Chapel Hill, 1956.

Robertson, M. L. *Emerging Curricula in Elementary Science*. Science Education, XXVI (December 1942), pp. 178-186.

Underhill, Orra E. *The Origins and Development of Elementary-School Science*. Scott, Foresman and Co., Chicago, 1941.

NSTA Activities

This Year's Convention

Convention time is nearly here, and that warrants a rundown on these basic facts:

Dates: Wednesday, March 20 through Saturday, March 23

City: Cleveland, Ohio

Headquarters: Hotel Cleveland

Theme: "New Frontiers for Science Teachers"

When to Make Your Attendance Plans: Immediately—if not sooner!

The highlights of the four-day program as well as detailed "what to do" information will be given, as usual, in the March issue of *The Science Teacher.* As is also customary, every NSTA member will receive a copy of the printed program in advance of the convention. In the meantime, here are some important things to keep in mind.

1. The convention opens Wednesday afternoon and the keynote address is scheduled for delivery at 1:30 p.m. This session is shaping up as one of the most significant of the meetings, so plan your arrival in Cleveland at least an hour or two beforehand—to give you plenty of time to register, freshen up, etc.

2. The exhibition of science teaching aids will again be a convention feature. There will be 60 booths of commercial exhibits, including textbooks, scientific apparatus, laboratory supplies, and other materials.

3. The city tours which were a feature of last year's Washington convention will be a major attraction at Cleveland, too. The tour program will include visits into Cleveland schools and other institutions as well as industrial establishments.

4. Saturday afternoon's program will be another highspot of the convention. Specially invited lecturers will give demonstrations in chemistry, physics, general science, and probably biology. They will be followed by the usual very practical kind of "Here's How I Do It" talks by classroom teachers.

5. All NSTA members will receive advance convention and hotel registration forms. Make sure you fill these out promptly.

Elections Committee

The Elections Committee of the NSTA met at the Netherland Hilton Hotel in Cincinnati on December 14 and 15 to choose the nominees for offices for 1957-1958. The names of many well-qualified people had been submitted to the chairman by the officers and members of the Association and its affiliated groups. Other names were suggested by the committee to insure wide geographical distribution, classroom-teacher representation at all levels and in all types of schools, and variety in major science interests.

The nominees selected are extremely well qualified for their respective positions and have already identified themselves by service to NSTA. The Association greatly appreciates their willingness to accept the nomination; unfortunately not all of them can be elected. Their photographs and biographical data start on page 27 of this issue.

Ballots now being mailed to NSTA members should be returned to Madeleine T. Skirven, Eastern High School, Baltimore 18, Maryland, ***postmarked on or before March 10.***

Members of the Elections Committee are Miss Skirven, *chairman;* Charles W. Alber, Muncie, Indiana; William G. Kessel, Terre Haute, Indiana; Violet Strahler, Dayton, Ohio; Kenneth Vordenberg, Cincinnati, Ohio; and Harold E. Ward, Huntington, West Virginia.

Chemistry Tests

New achievement tests for high school chemistry students will soon be available as the result of cooperation between the American Chemical Society and NSTA. The story of how the tests came about goes back to more than two years ago.

It starts with the tests in college chemistry which were developed by the Committee on Examinations and Tests of the ACS Division of Chemical Education. It was decided to expand the scope of these tests to include the high school level, and NSTA was invited to form a committee to do the job. The committee was to use the help of a large number of reviewers serving in an advisory capacity through correspondence with the NSTA group.

After the NSTA Board of Directors gave official approval to the project, the work of the new committee was launched at the 1955 Cincinnati convention. Elbert C. Weaver, of Phillips Academy, Andover, Massachusetts, was named chairman and Walter E. Hauswald, of Sycamore, Illinois, High School, was appointed secretary.

The committee produced two forms of an achievement test for the more or less standard first-year

course in high school chemistry. These tests have been tried out with several hundred students throughout the country and, with the results, norms have been developed.

The tests are now going to press and will soon be available for late second-semester use by interested teachers. They will be distributed at a moderate cost. For further information and to order the tests, contact the chairman of the ACS Committee on Examinations and Tests. He is Dr. Theodore A. Ashford and his address is Department of Chemistry, St. Louis University, St. Louis, Missouri.

Magazine Advisory Board

The new calendar year brings a change in the membership of the Magazine Advisory Board for *The Science Teacher,* the six-member board which is consulted on the journal's editorial policies and content. Two members are appointed each year for three-year terms by the NSTA Board of Directors. The new members this year are Abraham Raskin of Hunter College, New York City, and John Marean of Reno, Nevada, High School.

Dr. Raskin is coordinator of teacher education programs in school science at Hunter College and also teaches there in the Department of Physiology. He was formerly on the board of examiners at the University of Chicago. Dr. Raskin is serving this year as secretary-editor of the NSTA STAR (Science Teacher Achievement Recognition) Awards Program.

Mr. Marean is a teacher of chemistry at Reno High School and previously had ten years of experience as an industrial chemist. This year he is president of the Nevada Department of Classroom Teachers.

The new year also brought a change in the chairmanship of MAB. The new chairman is Richard H. Lape, head of the science department at Amherst Central High School, Snyder, New York. Mr. Lape, who is serving his second term as NSTA treasurer, has been an MAB member for two years. As chairman he succeeds Mrs. Edna B. Boon, biology teacher at Austin, Texas, High School, who has also served two years as an MAB member.

Continuing on the MAB are Dr. Richard M. Armacost, joint professor of biology and education at Purdue University, and Dr. Paul Brandwein, science editor at Harcourt, Brace and Company and formerly head of the science department at Forest Hills, New York, High School. Both are now serving their second year as MAB members.

The retiring board members are Dr. Paul Blackwood of the U. S. Office of Education, Washington, D. C., and Dr. Fletcher Watson, of the Harvard Graduate School of Education, Cambridge, Massachusetts.

Both the MAB and *TST's* editors want comments, suggestions, and criticisms from the journal's readers. NSTA members are invited to write their ideas to the new MAB chairman, Mr. Lape, at Amherst Central High School, Snyder, New York.

FSA Activities

West Coast Conference

Plans are now firmed up for the 4th annual West Coast Science Teachers Summer Conference, again to be sponsored by the Crown Zellerbach Foundation in cooperation with FSAF. This year the third co-sponsor will be San Jose, California, State College, which will be acting as the host college for the second time.

The dates of the conference will be June 23 to July 6, 1957. This year the Fellows will be limited to high school chemistry teachers. And because of increased financial support, the conference will be able to accommodate 40 teachers rather than 32 as in the past.

Limited to the seven western states, the conference will include ten fellows each from Washington, Oregon, and California. The remaining ten will be teachers from Idaho, Arizona, Nevada, and Utah. Each Fellow will receive a $200 stipend plus travel allowance.

Official application forms will be mailed soon to NSTA chemistry teacher members and other chemistry teachers in the seven western states. Interested teachers who do not receive the forms may write for them to NSTA headquarters, 1201 Sixteenth Street, N.W., Washington 6, D. C.

The purposes of the conference include aiding chemistry teachers to increase their knowledge of advances and opportunities in the field of chemistry. The conference program will include lectures by leaders in the chemical industry and the field of chemical education and research, seminars on the problems of teaching chemistry, demonstrations and presentations, and field trips to plants and research institutions in the San Francisco Bay area.

As in past years, the Fellows will report on their sessions in *The Science Teacher*, and additional reprints of the report will be made available. A primary target of the reporting process will be relating class demonstrations more closely to laboratory work.

On-The-Job Research

Working on a plan that might make money for research grants available to high school science teachers, an FSAF committee is asking for opinions from the high school teachers. The committee wants to know what teachers would like to study if the necessary support and help can be obtained. Write to the committee chairman, Dr. Philip G. Johnson, Stone Hall, Cornell University, Ithaca, New York. A postal card statement will do but longer proposals in letter form are also desired. Dr. Johnson asks that you give a rough estimate of the amount of support you think is needed.

The basic idea being developed by the committee is that high school science teachers could and would carry on scientific, educational, operational, or other research were funds for assistants, equipment, and extra salary available during the school year and especially during vacation and summer periods. Research grants are very common at college levels but virtually unknown at secondary school levels. Send your ideas in and thereby add your bit to help create a real opportunity for the high school science teaching profession.

Roster of Sponsors

The close of 1956 saw two more names added to the roster of sponsors of the Future Scientists of America Foundation program, making a total of 74 for the year. The two new sponsors are:

Radio Corporation of America
Roberts Dairy Company (of Omaha, Nebraska)

The Gifted Student

How to help teachers identify and encourage the gifted science student is the concern of a new FSAF committee. Its assignment is to prepare a forthcoming FSAF bulletin which will report to teachers on what has been done and what can be done to aid the development of students with high aptitude in science.

One of the committee's first actions is a call for assistance from teachers who have had experiences working with gifted science students. The committee wants a report on the problems that were faced and how they were solved, specific questions which arose, and teacher ideas and suggestions for encouraging such students.

Dr. Robert Donaldson, of the New York State University College for Teachers, at Plattsburgh, is the chairman of the committee. If you have a report on your experiences working with gifted science students, or if you have ideas to help other teachers on this phase of science teaching, write to Dr. Donaldson as soon as you can at his Plattsburgh, New York address. He wants to hear from you.

Books Received

LIVING DESERT and AFRICAN LION (Walt Disney's True-Life Adventure Series). *Living Desert* text by Marcel Ayme, Louis Bromfield, Albert Camus, Paul Eipper, Julian Huxley, Jack Jungmeyer, Francois Mauriac, Andre Maurois. *African Lion* text by James Algar. 73p, 75p. $10 each. Simon and Schuster, New York 1956.

Two of a series based on Walt Disney's True-Life Adventure films, with photographs from the films. These are handsome books, both in their typography and their profuse color illustrations. *Living Desert* is a combination of articles by well-known authors, dealing with the desert itself, the various animals that live in it, and the flowers that grow there. *African Lion* is the biography of the King of Beasts and the unique wildlife inhabiting his domain. Both books have interesting and readable text, which is attention-holding at the same time that it is instructive.

MARVELS OF INDUSTRIAL SCIENCE. Burr W. Leyson. 189p. $3.50. E. P. Dutton & Co., Inc., New York. 1955.

A report on many of the new products and processes developed by modern American industrial science. The book, which is written in non-technical language, gives certain facts about these products and processes—their discovery, their manufacture by modern industrial methods, and their uses. Photographs and diagrams illustrate the text.

ALL ABOUT THE ATOM. Ira M. Freeman. 146p. $1.95. Random House, New York. 1955.

A simply-written explanation of the atom and how it works. The physicist-author explains what things are made of, how energy makes things go, and how the atom idea was developed. The book is illustrated with drawings and diagrams.

200 MILES UP—THE CONQUEST OF THE UPPER AIR. J. Gordon Vaeth. 261p. $5.00. The Ronald Press Co., New York. 1955 (Second Edition).

An illustrated account of the progress of the American program of upper air research since its inception in 1946. The book also gives a progress report on man's coming mastery of space.

THE WORLD WE LIVE IN. By the Editorial Staff of Life Magazine and Lincoln Barnett. 216p. $4.95. Simon and Schuster, New York. 1956.

Life's special edition for young readers of its widely-acclaimed series of articles on the history of the earth, which were previously published in book form for adults. The book is profusely illustrated in color.

Audio-Visual REVIEWS

THE FLOWERING DESERT. 10 min. Color. Bailey Films Inc., 6509 DeLongpre Ave., Hollywood 28, Calif.

Recommendation: Junior and senior high school biology areas and upper elementary school grades in nature study areas.

Content: Presenting a great variety of flowers that grow in the desert, the film shows that flowers are just as plentiful there as elsewhere. It demonstrates that all living things will grow and mature if conditions are favorable.

Evaluation: Excellent photography and good sound and recording qualities. Printed captions could have been added to advantage. The film could be used to correlate teaching units of plant study, color, and adaptation.

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THE HUMAN BODY: CIRCULATORY SYSTEM. 14 min. sound, 1956. B & W, Color. Coronet Instructional Films, Coronet Bldg., Chicago 1, Ill.

Recommendation: Senior high school biology and health classes.

Content: Old woodcut scenes provide a good introduction to the early scientific discoveries of the structure and function of the circulatory system. These contrast effectively with flow diagrams presenting modern knowledge of the circulation of the blood in the human body. The film gives a basic understanding of circulation.

Evaluation: Good commentary and photography, highlighted by the effective use of diagrams. The vivisection sequences of internal structures of a dog may limit widespread use of the film.

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THE CHIPMUNK AND HIS BIRD FRIENDS. 10½ min. sound, 1955. $55 B & W, $100 Color. Bailey Films, Inc., 6509 De Longpre Ave., Hollywood 28, Calif.

Recommendation: Nursery school, kindergarten, and elementary grades in nature study, science, language arts, social studies, creative arts, and music areas.

Content: This is a fascinating true story on the adventures of a chipmunk and his bird friends in the forest. The film shows chipmunks and squirrels storing their supply of acorns underground while a chickadee and nuthatch search in vain for insects. Natural color close-ups show the sizes, colors, and feeding habits of these animals.

Evaluation: Well organized content and excellent color photography and material for younger children. A detailed teacher's guide is included.

FLOWERS AT WORK. 11 min., 1956 (Second Edition). $50 B & W, $100 Color. Also available for rental at rental libraries throughout the country. Encyclopaedia Britannica Films, 1150 Wilmette Ave., Wilmette, Ill.

Recommendation: Junior and senior high school levels.

Content: This film study of easily identified flowers illustrates the structure and function of flowers and shows the importance of insects in pollination.

Evaluation: Outstanding photography, with excellent use of the time-lapse technique. The film is well organized in content, covers the topic effectively, and has fine instructional qualities. The sound could be slightly improved. The teacher's guide which accompanies the film is unusually complete and includes interesting activities and topics for discussion after the film is seen.

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A FROG'S LIFE. 11 min. sound, 1955. $55 B & W. Coronet Instructional Films, Coronet Bldg., Chicago 1, Ill.

Recommendation: Intermediate and junior high school levels in science, nature study, and biology areas.

Content: Depicting the life cycle of the frog, the film uses close-up photography to record the gradual changes that occur as the spawn develops into tadpoles and then into young frogs. The functions of the body parts such as gills, tail, and legs are explained, as well as the frog's manner of eating, breathing, and maneuvering itself in the water.

Evaluation: Good photography and content. There is some distracting effect in the commentary and musical accompaniment. A teacher's guide comes with the film.

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SEED DISPERSAL. 11 min. sound, 1956 (Second Edition). $50 B & W, $100 Color. Encyclopaedia Britannica Films, 1150 Wilmette Ave., Wilmette, Ill.

Recommendation: High school biology classes and other nature study groups.

Content: The film gives thorough coverage to seed dispersal, including the means by which seeds are transported and several of the more interesting plant adaptations that insure more effective dispersal.

Evaluation: Excellent photography and commentary. The use of time-lapse photography adds considerably to understanding of the subject.

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JOBS IN ATOMIC ENERGY. 12 min. sound, 1956. $55 B & W. Handel Film Corp., 6926 Melrose Ave., Hollywood 38, Calif.

Recommendation: High school and adult levels for use for general overviews in science, vocational counseling, and assembly or other adult group programs.

Content: This is the 26th film in the "Magic of the Atom" series dealing with the peacetime uses of the atom. The film shows scientists, technicians, and laborers at

work through the country, doing their jobs in atomic research, power production, industry, agriculture, and medicine. The vast diversification of job opportunities due to peacetime uses of atomic energy is stressed.

Evaluation: Good to excellent in instructional qualities, technical qualities, and classroom values. The film should stimulate interest in science as a career.

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THE WOODCOCK. 6 min. sound, 1956. $50 Color. Crawley Films Ltd. for International Film Bureau Inc., 57 E. Jackson Blvd., Chicago 4, Ill.

Recommendation: Junior and senior high school biology areas.

Content: Showing the natural habitat of the woodcock, the film deals with various phases of the care of the young bird. Particularly well presented are the woodcock's plumage pattern, natural camouflage, and nesting and feeding habits.

Evaluation: Excellent close-up shots. The film should stimulate interest in birds and phases of bird study.

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